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Service Paper

UNIT ORGANIZATION OF THE TOPIC
THE BEGINNINGS OF THE MACHINE AGE

Submitted by

Thomas Francis Cosgrove

(A.B., Boston College, 1938)

In partial fulfillment of requirements for
the degree of Master of Education

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First Reader: Roy O. Billett, Professor of Education

Second Reader: William H. Cartwright, Assistant Professor of Education

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CHAPTER I

THE PURPOSE OF THIS UNIT

This service paper concerns one unit of study, "The Beginnings of the Machine Age," organized and presented according to the basic principles and procedures found in Fundamentals of Secondary School Teaching[1] and in the course in the Unit Method offered by Dr. Roy O. Billett, professor of education in the Boston University School of Education. The use of the unit method in the schools of America, in the writer's opinion, would provide the true principles and fundamentals of teaching in the secondary school with regard in particular for meeting the problem of individual differences.

The City

This unit has been taught to seventh-grade classes in the Browne Junior High School, Malden, Massachusetts. Today Malden is essentially an industrial city and thus the topic was of particular native interest. Settled in 1630, the city was originally a community of many small

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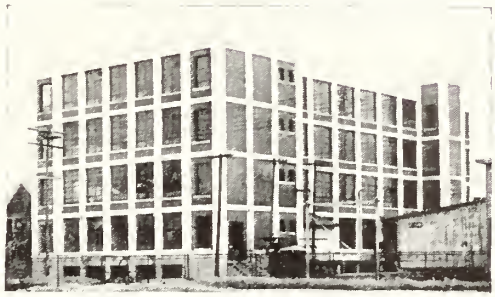
[1] Roy O. Billett, Fundamentals of Secondary School Teaching, Houghton, Mifflin Company, Boston, 1940.

NINE MALDEN INDUSTRIES WHICH REQUIRE

MODERN MACHINES

F. H. ROBERTSON CO.



MALDEN SPINNING & DYEING CO.

CONVERSE RUBBER CO.

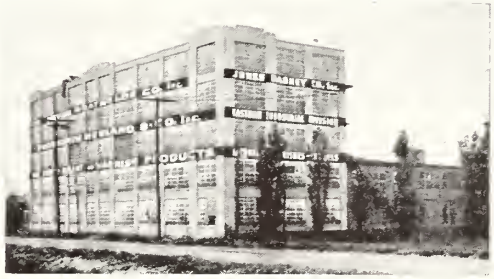
CONTINENTAL CAN CO.

LAWSON MACHINE & TOOL CO.

POTTER DRUG & CHEMICAL CO.

FRIEND BROS.

INDUSTRIAL TERMINAL



DEVOE & RAYNOLDS CO.

farms. One big industry, rubber shoe work, developed during the nineteenth century and provided work for many residents of the city and neighboring communities. Today Malden is representative of the effects of the Machine Age, with a population of 58,000, and over one hundred fifty industries located within its boundaries.

Its industrial advantages include transportation on two main lines of the Boston and Maine Railroad, good factory sites along the railroad, and along the Malden River, tidewater transportation on the Malden River into Boston Harbor, nearness to the Port of Boston and the Logan Airport.

The School

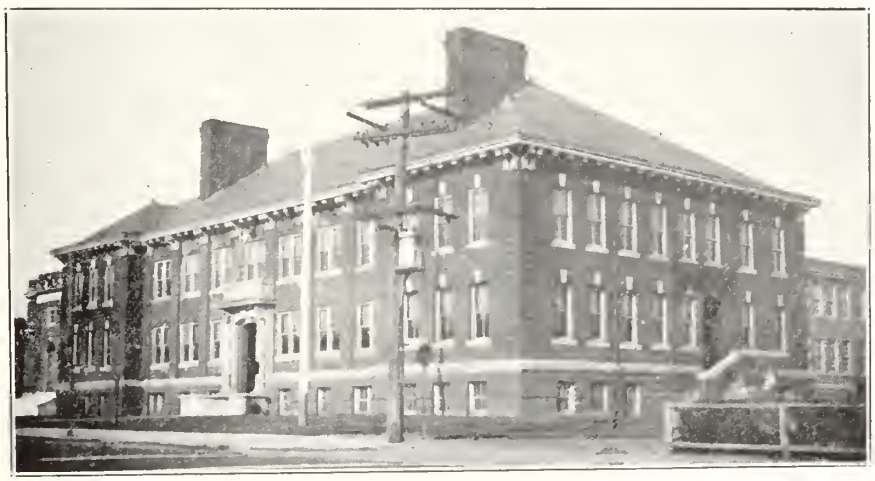
The city's public school system includes twelve grammar schools, three junior high schools, and both an academic and vocational high school. Seven thousand four hundred thirty-one pupils were enrolled in 1948 under three hundred twenty-nine teachers.

The Browne Junior High School is in the eastern part of Malden, serving pupils from three sections of the city, Maplewood, Broadway, and Linden.

The school, under the direction of William J. Sullivan, principal, was originally a grammar school of

BROWNE JUNIOR HIGH SCHOOL

MALDEN, MASS.



five grades and took its present form in 1926 when Malden reorganized its type of vertical organization from the nine-four to the six-three-three plan. The present enrollment is four hundred seventy-eight. The school building contains two wings in addition to the old two storied building, housing twenty classrooms, a school library, two shop rooms for manual training, one mechanical arts laboratory, one sewing room, a cooking room, a science room, and drawing rooms. One wing holds the school auditorium which will seat five hundred people and a gymnasium complete with shower rooms. The school is modern and well equipped with rest rooms for pupils, lounge rooms for teachers, and a nurse's room with a trained nurse in attendance part time.

Space Provisions and Equipment

The classroom in which the unit was taught is on the second floor of the old building and measures twenty-four by thirty by sixteen feet high. It can seat forty-two pupils. The room has a western exposure. There are blackboards on three sides of the room. Maps and charts are hung on the northern wall with blackboard space reserved for written assignments and class use. A work table, a display table, and five large bulletin boards

PLATE 3. CLASSROOM WITHOUT UNIT METHOD.

PLATE 4. ANOTHER VIEW-CLASSROOM WITHOUT UNIT METHOD.

Browne Junior High School

FLOOR PLAN

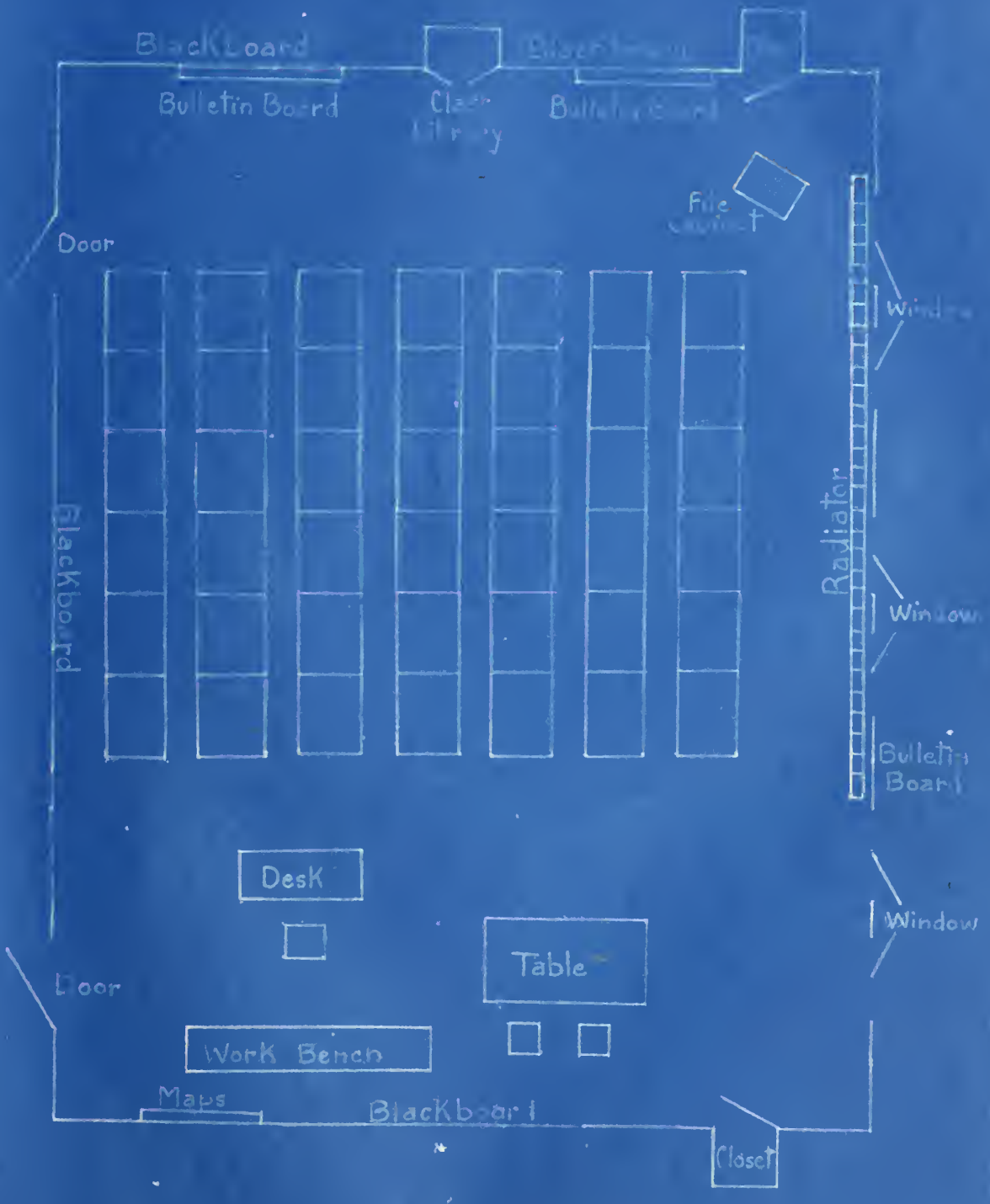


FIGURE 1. FLOOR PLAN OF THE ROOM.

are part of the equipment in this room. As no file cabinet was available, an unused set of six physical educational lockers was put into use as a file cabinet. Each locker is approximately twelve inches by twelve inches and about fifteen inches deep. The set consists of the six lockers one on top of the other. This new original file cabinet will be used in the future until a conventional file cabinet replaces it. As the desks and chairs of this room are stationary, all group discussions were conducted in a semi-circular fashion with the student chairman presiding.

A silent film projector, a film-strip projector, and a portable ground glass screen were utilized in this room. Films were shown before noon as the sun was too strong in the afternoon to produce good results. Sound films were shown in the school auditorium. All sound films were shown during the home-room period. Thus all students interested in this unit were able to attend the films, if they desired.

The Test

The items in the tests were based on the delimitation. The diagnostic test was given to the classes with the understanding that the results would have no

bearing on their final marks. This test had ninety true or false items. All questions were answered by all the pupils. The diagnostic test and final test which was actually the same test as the diagnostic test required one forty-minute period. The results are shown in Chapter III.

Time Allotment

For the three seventh-grade classes, three periods per week for six weeks were allotted as follows:

Period 1: Pre-test

Period 2: Introduction

Periods 3,5,6,9,10,13,14: Discussion classes

Periods 4,7,8,11,12,15,16,17: Laboratory classes

Period 18: Mastery test

The Pupils

This unit was taught to seventh-grade pupils who were in their first year in junior high school and had come from two different grammar schools. They had been tested for mental age, reading ability, and intelligence quotient, and the complete results are recorded in chart form. Their chronological age varied from ten to fourteen, although the majority were eleven and twelve.

Table 1. Number of Pupils and Their Ages

Age of pupils (1)	Number of pupils (2)
10	2
11	31
12	31
13	10
14	1

These pupils will make their decision in Grade VIII as to which course they will elect to follow through high school. At present 26 intend to take the college preparatory course, 27 plan to take the commercial course, and 9 will take the general course.

Questionnaires given to all these pupils revealed their background, interests or hobbies, and travels which had a connection with the unit. The following tables are a partial result of these questionnaires.

Table 2. Native Country and Numbers of Mothers, Fathers, Grandparents Born There.

Country (1)	Mother (2)	Father (3)	Grandparents (4)
America.....	36	38	50
Italy.....	9	7	50
Canada.....	6	5	24
England.....	5	5	22
Newfoundland.....	4	3	10
Ireland.....	4	4	32
Russia.....	3	3	26
Scotland.....	3	2	12
Sweden.....	1	1	19
Holland.....	1	1	4
France.....	1	2	7

Table 2 (continued)

Country	Mother	Father	Grandparents
(1)	(2)	(3)	(4)
Finland.....			4
Germany.....			8
Poland.....			4
Denmark.....			4
Unknown.....	2	4	24

The majority of the pupils' parents were born in America but ten other nationalities are represented. This section of Malden at one time was composed of Scandinavian families. However, today the population includes many families of Italian and Irish descent.

Table three shows that two-thirds of the parents have received at least a high school education.

Table 3. High School and College Education of Mothers and Fathers.

Education	Mothers	Fathers
(1)	(2)	(3)
High School Graduates	42	41
College Graduates	7	10

The families of the group were made up of one to eleven children. The majority of the families had one to three school-aged children.

Table 4. Number of Children in Families.

Size of family (1)	Number of families (2)
1	10
2	17
3	18
4	10
5	9
6	4
7	1
8	2
9	2
10	1
11	1

Table five disclosed that all of the pupils were familiar with train travel and most had traveled by ship. Since this unit is concerned with the development of railroads and shipping, a knowledge of the travel habits of the pupils was desirable.

Table 5. General Information

Question (1)	Yes (2)	No (3)	Fair (4)
Do you like school?	55	8	14
Have you ever been			
on a ship?	61	14	
on a train?	75	0	
on a plane?	12	63	

History is the favorite academic subject of these pupils although gymnasium work outranks it as the favorite school subject. Only three pupils listed history as the

subject they most disliked.

Table 6. Personal Preferences.

Favorite Subject (1)	Number of pupils (2)
Gymnasium	30
History	14
Music	7
English	4
Civics	3
Art	3
Science	3
Sewing	3
Arithmetic	3
Geography	1
Hygiene	1
None	3

Subject most disliked (3)	Number of pupils (4)
English	26
Penmanship	14
Geography	9
Science	7
Arithmetic	6
Guidance	3
History	3
Civics	2
Art	2
Gymnasium	1
None	2

Choice of high school courses is made ordinarily in Grade VIII. It can be seen that the usual choices are either the college preparatory course or the commercial course.

Table 7. What Course Are You Going To Take in High School?

Course (1)	Number of pupils (2)
Preparatory	26
Commercial	27
General	9
Scientific	4
Trade School	3
Manual Arts	2
Not going to high school	4

In their leisure time the children favored sports or outdoor recreation overwhelmingly. Their future plans were widely varied and showed a choice of over twenty occupations.

Table 8. Recreation and Ambition.

Favorite Recreation (1)	Number of pupils (2)	Future Ambition (3)	Number of pupils (4)
Sports	43	Office Worker	11
Bicycle	7	Baseball Player	9
Take care of babies	8	Aviation	9
Making planes	6	College	8
Play	2	Teacher	4
Play piano	2	Army or Navy	3
Listen to radio	2	Lawyer	3
Reading	2	Musical Career	2
Horseback riding	1	Doctor	2
Homework	1	Artist	2
Fishing	1	Nurse	2
		Dress Designer	1
		Housewife	1
		Horse Trainer	1
		Nun	1
		Forest Ranger	1

Table 8 (continued)

Favorite Recreation	Number of pupils	Future Ambition	Number of pupils
(1)	(2)	(3)	(4)
		Laborer	1
		Actress	1
		Bellhop	1
		Engineer	1
		No choice	10

The intelligence quotient rating of the children ranged from sixty-five to one hundred thirty-four. The Iowa Every Pupil Tests of Basic Skills were used to find the mental age, intelligence quotient, reading grade and arithmetic grade for each child. The California Test of Mental Maturity supplied the logical reasoning ability and vocabulary rating of the children.

Table 9. Mental Abilities of Pupils and Test Results.

Pupil	Chronological Age**	Mental Age**	Intelligence Quotient**	Reading Grade**	Arithmetic Grade**	Logical Reason*	Vocabulary*
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
1.	13-7	10-11	80	6-1	5-9	20	20
2.	12-1	12-6	103	7-6	6-7	70	40
3.	11-11	12-1	101	6-7	8-6	60	40
4.	12-3	14-5	110	8-2	7-5	60	60
5.	13-4	9-11	74	3-6	6-2	20	1
6.	12-6	11-11	95	7-2	6-9	60	30
7.	13-5	13-2	98	6-7	7-3	40	40
8.	13-6	9-11	73	4-3	6-3	10	20
9.	12-1	13-6	111	8-6	7-3	80	60

* California Test of Mental Maturity
** First five columns-Iowa Every Pupil Tests of Basic Skills.

PLATE 5. CLASS 321.

PLATE 6. CLASS 322.

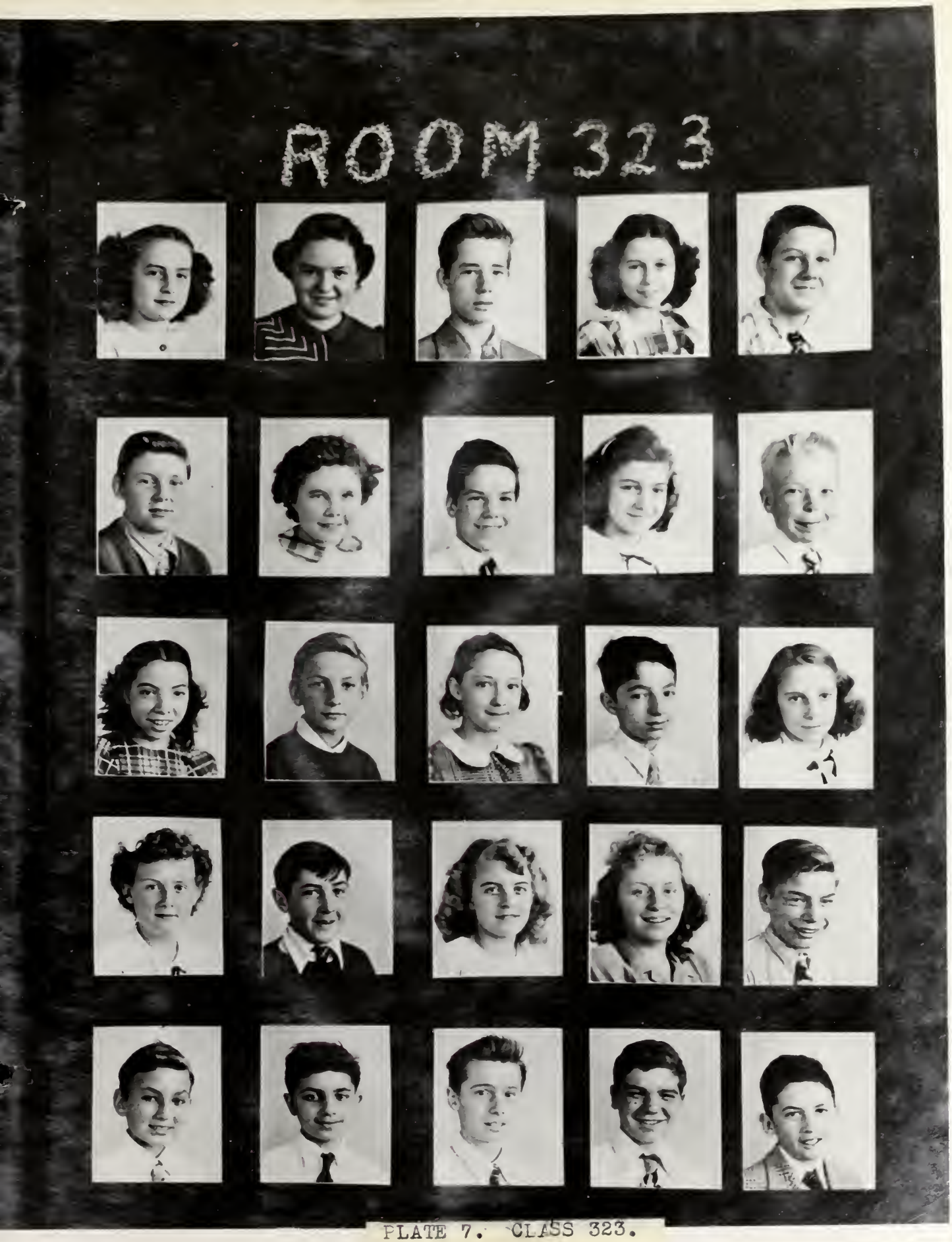


PLATE 7. CLASS 323.

Table 9 (continued)

Pupil	Chronological Age	Mental Age	Intelligence Quotient	Reading Grade	Arithmetic Grade	Logical Reason	Vocabulary
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
10.	12-3	12-3	100	6-4	7-0	40	40
11.	11-1	12-1	109	4-8	7-0	70	50
12.	12-4	13-7	109	7-9	8-5	90	40
13.	11-7	14-2	122	8-8	8-6	90	80
14.	11-6	15-6	134	9-0	9-1	95	90
15.	12-3	11-9	96	5-2	7-2	80	10
16.	11-3	13-8	121	7-3	8-1	90	90
17.	12-7	11-6	91	5-6	7-2	50	50
18.	11-6	14-1	122	7-7	7-9	9	70
19.	11-7	10-7	88	6-4	6-6	40	30
20.	11-3	13-4	116	7-0	7-5	90	70
21.	11-2	13-7	118	8-2	8-0	99	50
22.	12-7	11-5	90	6-3	5-0	70	20
23.	11-11	13-4	112	4-9	7-5	95	60
24.	13-8	8-8	65	5-2	6-7	10	10
25.	12-7	10-9	93	5-6	7-1	60	30
Room 322							
26.	10-8	11-8	109	3-5	6-2	5	5
27.	12-1	12-10	106	7-0	7-7	60	50
28.	12-8	14-1	111	9-1	7-5	90	60
29.	12-1	13-5	111	7-3	7-3	70	50
30.	11-8	11-6	97	5-2	7-2	80	20
31.	12-2	13-2	108	7-8	8-1	60	40
32.	12-2	11-8	95	5-4	6-2	60	20
33.	12-2	14-0	115	5-7	8-5	90	70
34.	11-0	13-11	118	4-8	7-7	90	60
35.	11-0	13-1	118	7-5	7-7	90	80
36.	11-7	12-3	106	4-5	7-4	80	50
37.	13-5	12-1	87	3-9	6-8	50	10
38.	13-11	12-1	87	8-3	6-4	40	40
39.	12-1	13-6	112	5-9	7-6	95	40
40.	12-3	11-10	96	5-8	6-6	60	30
41.	12-3	11-10	96	8-2	7-8	30	40
42.	11-6	10-11	95	4-7	6-6	50	50
43.	12-4	13-9	111	6-2	7-0	95	50
44.	13-0	12-7	96	5-2	6-4	40	30
45.	12-1	12-7	104	6-1	7-2	95	50
46.	11-11	12-9	106	5-9	7-5	90	70

Table 9 (continued)

Pupil	Chronological Age	Mental Age	Intelligence Quotient	Reading Grade	Arithmetic Grade	Logical Reason	Vocabulary
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
47.	11-10	14-8	123	9-3	7-4	99	99
48.	12-3	13-2	107	6-1	7-0	95	40
49.	10-8	11-8	109	7-4	6-9	70	80
50.	11-8	14-0	127	7-1	8-3	95	90
Room 323							
51.	11-4	11-6	101	4-7	7-0	70	50
52.	12-3	13-5	109	8-5	6-9	60	60
53.	11-8	11-9	100	5-2	7-5	95	40
54.	12-0	11-9	97	5-5	7-0	60	10
55.	11-8	12-0	102	6-9	7-2	90	70
56.	13-3	12-0	91	4-8	6-5	20	30
57.	12-7	12-10	102	7-7	7-8	70	40
58.	11-11	13-1	113	9-3	8-1	95	90
59.	13-10	11-6	83	4-8	6-1	60	10
60.	12-2	11-5	93	5-0	7-2	30	30
61.	11-0	11-8	96	6-3	6-9	90	30
62.	11-11	13-1	109	6-6	7-3	80	70
63.	11-11	15-4	129	9-1	8-2	99	80
64.	12-6	12-3	110	6-8	7-3	60	40
65.	11-10	12-0	102	5-3	7-7	90	70
66.	11-6	11-6	100	6-1	6-5	70	60
67.	12-3	12-4	100	5-6	7-5	70	30
68.	12-1	15-4	126	9-8	9-0	99	80
69.	12-10	13-4	103	7-7	7-0	80	50
70.	11-11	12-7	105	5-4	7-2	95	50
71.	11-11	12-10	108	5-7	7-5	70	70
72.	12-1	11-2	92	5-3	6-4	40	20
73.	14-0	10-8	76	5-4	6-5	10	5
74.	11-10	13-3	111	6-9	7-1	95	70
75.	11-9	13-6	114	5-7	7-8	95	60

Definition of Terminology Used In This Paper

The following definitions of terminology used in this paper have been formulated in accordance with the teachings of Dr. Roy O. Billett, of Boston University given in his course at Boston University, "Unit Method in the Secondary School," and in his book, Fundamentals of Secondary School Teaching, published in 1940 by Houghton Mifflin Company, Boston.

Unit: The unit is the statement in complete declarative sentences of the goal which the teacher hopes to reach in his teaching. This goal is stated in "terms of a desirable change to be made in the pupil in concept or skill, and hence in resultant ideal, attitude, or appreciation."[1]

Delimitation of the unit:[2] The delimitation of the unit is a statement of the lesser learning products which are to be made the direct object of instruction in the class within a given time allotment. Each item of the delimitation, like the unit, is given in one or more declarative sentences. Both the unit and the delimitation of the unit are for the use of the teacher only.

---

[1] Roy O. Billett, Fundamentals of Secondary-School Teaching, Houghton Mifflin Company, Boston, 1940, p. 505.

[2] Ibid., p. 505.

Probable incidental and indirect learning products:[3] This section includes the ideals, attitudes, or appreciations brought about indirectly in the teaching of the unit, and are not the direct objective of instruction.

Study and activity guide:[4] The activity guide, which is given to each pupil for his personal use, is a mimeographed list of the unit activities, the bibliography, and other necessary directions. It should be accurate, legible, and attractive.

Optional related activity:[5] This is a list of activities from which the pupil is free to choose what he would like to do and which will produce an increase in the pupil's educative growth. The teacher should advise the pupil on his choice and after giving his approval should continue to guide the pupil.

The unit assignment:[6] This is the general plan of teacher-pupil activity and, while being carefully planned in advance, should allow for modification as need arises.

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[3] Roy O. Billett, Fundamentals of Secondary-School Teaching, Houghton Mifflin Company, Boston, 1940, p. 506.

[4] Ibid., p. 508.

[5] Ibid., p. 507.

[6] Ibid., p. 506.

CHAPTER II

THE BEGINNINGS OF THE MACHINE AGE

Unit

During the nineteenth century the American people changed their ways of living. They gradually became a manufacturing people, not only supplying their own needs, but also shipping machine-made goods to all the world. At the same time with the use of improved tools and machinery in farming, they were able to raise larger crops with less labor. Improved methods of transportation such as locomotives and steamboats made it possible for them to send their products to ever wider and more distant markets.

Delimitation of the Unit

1. In 1784 Edward Cartwright, an English clergyman, invented a loom for weaving cloth which could be run by water power.

2. James Watt invented a steam engine that could run machinery in 1765.

3. The use of machinery, driven by water power or steam, rapidly spread from clothmaking to other kinds of

manufacturing such as the leather industry which included making shoes, harnesses, and saddles.

4. The people lost much of their old-time freedom and were obliged to work longer hours, away from their homes, and under stricter conditions.

5. The change from handwork to machine work and from the home to the factory is called the "Industrial Revolution."

6. Whitney's cotton gin invented in 1793 greatly increased clothmaking, caused the growth of factories, and gave employment to many others.

7. The two inventions that probably had the greatest effect in saving labor and increasing comfort in the home were the sewing machine (1846) and the iron stove (about 1840).

8. Iron plows and harrows took the place of the old wooden tools during the early nineteenth century.

9. Threshing machines were beginning to be used to separate the grain from the straw in 1786.

10. In 1831 Cyrus McCormick made the first successful reaper.

11. Improved tools and machinery increased farm production and enlarged both home and foreign commerce.

12. The invention of the steamboat was the first

great step in the improvement of transportation. Robert Fulton's "Clermont" in 1807 was the first successful steamboat.

13. The locomotive (1812) drew the cities of the United States together.

14. In 1850 the government aided railroad construction by granting public land to the railroads.

15. The railroads carried the agricultural products of the West to the cities of the East and brought back the goods of the Eastern stores and factories.

16. While the changes brought about by the Machine Age were beneficial, it brought about for the government and the people such problems as the protective tariff, the United States Bank, the public land system, and the Indian problem.

List of Probable Indirect and Incidental Learning Products

A. Indirect

1. An appreciation of what freedom of time means.
2. A new attitude toward farming with machinery and without machinery.
3. An appreciation of the interdependence of the people of all the States in the union.

B. Incidental

1. A better understanding of the various machines which make our modern life more comfortable.
2. A clearer vision of how the world has become smaller by means of transportation.
3. The development of the ability to cooperate within a group through participation in committee work.
4. The development of the library skills through the use of textbooks, reference books, dictionaries and encyclopedias, note taking, making of bibliographies and the collection of materials for use in the optional related activities.
5. The improvement of certain skills such as the making and interpreting of charts, graphs, and maps.
6. The development of skill in the use of different kinds of pamphlets.
7. An ability to express significant facts through the use of graphs, posters, and diagrams.

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The Unit Assignment

A. Introductory Activities

The class looks over a collection of pictures of all types of machines including the spinning wheel, the loom, the cotton gin, the sewing machine, the iron stove, plows, rakes, harrows, threshing machines, reapers, Robert Fulton's "Clermont," the "Queen Mary" and several types of steam engines. These pictures are placed on a very large bulletin board over which is placed a red sign with large black letters spelling the word, "Machines."

A discussion of the word "machine" should follow. (1) Is a rake a machine? (2) Is there no limit to the meaning of the word machine? A discussion should develop over the classes of machines. (1) Machines provide our clothes. (2) Machines provide our food. (3) Machines provide our transportation. (4) Machines provide for our other comforts such as heat.

The title of the unit is written on the board, "Beginnings of the Machine Age." A discussion on how people made clothes, produced food, and produced food without machines should be introduced at this time.

B. Core Activities

1. Early engines and their effect

a. How did early spinners produce cloth? Have you ever seen a spinning wheel or a picture of a Pilgrim at a spinning wheel? Do people spin cloth today? Where does your mother get her cloth? (1:311-312; 2:83; 7:1336, 1712a; 7:1845d)

b. What cloth making machines were invented in England around 1767? (1:312-313; 4:292; 7:1335)

c. What is a loom and who invented it? How was it run? Do you think looms are still used today? Find out if any Malden factories use looms today. (1:312-314; 1:523; 4:292-293; 5:288,291; 7:1755b, 1873b)

d. What are the basic principles of a steam engine? Do you think you have ever seen one work? What kind of a machine travels on the Saugus Branch R.R.? (1:312; 5:288; 7:1331, 1331c)

e. Who invented the steam engine? For what purpose was it first used? Are there any other uses for a steam engine? What steam

engines have you seen the City of Malden use on its streets? Have you ever seen a steam train, a steam boat, a steam roller, a steam shovel? Do the coal companies on the Malden River make use of the steam engine? (2:197, 244; 5:316; 7:1336,1342b, 1211)

f. Did the ways of living and working change greatly with the invention of the steam engine? Where did men do their work after this? Were men happier working at home or in the factories? Did they work longer or shorter hours? Do you think that the many factories in Malden came about as a result of this invention? Do you think that many people in Malden do all their work at their own homes? (1:313; 5;289; 7:1346, 435b)

g. How much freedom was gained or lost because of the new machines? Do you think that factory workers today work too long hours? Find out how many hours Malden factory workers are employed per week. Give reasons why you would not have liked to work in a factory in 1865. List the differences

between early factory conditions and those of modern factories. (1:313; 5:290; 6:128)

h. Did the growth of factories affect the lives of men, women, and children to any extent? Do the factories of Malden employ many people? Have you ever visited a Malden factory? Name five Malden factories and tell what they manufacture. What other products are made in Malden? Have you ever used or worn any products made in Malden? (1:313; 5:289; 7:1345, 346)

i. Do you know what the words "Industrial Revolution" mean? Why did the Industrial Revolution cause so many changes? How has the Industrial Revolution affected your life? How did it affect your parents and grandparents? (1:314; 5:287, 292; 6:128; 7:435b)

j. Where does cotton grow? What climate is best suited for its cultivation? Tell why you would not expect to see cotton growing in Massachusetts or Malden. What does grow in Malden? (1:315; 2:184; 3:316; 6:144, 167)

k. How does the cotton plant grow? Have you

ever seen a cotton boll? What does it look like? Have you ever seen cotton in your medicine chest at home? (2:184; 3:342; 6:24; 7:688c, 701b)

l. What must be done to the cotton plant to prepare it for use? Would this be easy to do? How long did it take to clean the cotton? (1:315; 2:184; 5:290; 7:1301)

m. Who was Eli Whitney and what did he invent? How long did it take his machine to clean cotton? Has this machine affected your clothing in any way? Do you suppose this machine made cotton cloth cheaper in price? (1:314-316; 4:294, 295; 2:184-185, 212; 5:290)

n. How did Whitney's invention work? What effect did the invention have on cotton growing, the growth of factories, and employment? Was more or less cotton grown? Would you expect more or less people to be employed? Did this invention cause an increase or decrease in factories? Explain how factories in Malden eventually were helped by this invention. (4:259; 3:342-343; 6:126, 144)

o. What invention around 1850 caused more comfort in the home than any other invention? Do homes in Malden use fireplaces, stoves, or furnaces? What heats your home? How did people in 1830 cook their food? How does your mother cook her food? (1:317; 2:249, 263; 5:410; 6:126)

p. Does your family own a sewing machine? When was the sewing machine invented and who invented it? Have you ever tried to use one? Do girls use sewing machines in Domestic Science classes? Does your mother use one? How much time does she save by using a sewing machine instead of sewing by hand?

q. How does the sewing machine help the women of our homes? Ask your mother how long it takes to sew a dress by hand. Compare the time to sew a dress by hand and the time required for a machine-made dress. Do Malden factories have sewing machines? Name five Malden factories which have sewing machines. Does the sewing machine affect the price of your coats, hats, shoes, rubbers, dresses, suits and sweaters?

r. How would factories with power sewing machines affect the lives of people? What industry would be affected most? Explain how factories with sewing machines have affected your mother's life. Find out how many men and women work the machines at Bascom and Beshongs Company, Center Street, Malden. How does the product of Bascom and Beshongs Company affect your family? (1:320-321; 4:297; 6:126-127)

2. Farming tools and machinery

a. Do you believe a farmer of Biblical times would know how to use the farm tools of our Revolutionary period? (1:317-318)

b. What kind of tools do you think the people of the Revolutionary period used? Name them. What were they made of? (1:318-319; 2:264; 5:405)

c. Around 1850 what great change took place in the material which tools were made of? Make a list of the tools you have in your home. Of what material are they made? (1:320; 2:264; 5:405)

d. What is a harrow? Do you think it would be

used on a large or a small farm? Does the Malden City Farm have a harrow? (1:319; 5:491)

e. How does a farmer separate grain from straw today? How was grain separated from straw during the Revolutionary period? (1:318; 2:264; 4:339-340: 5:404-405; 7:1336)

f. What is a reaper? Who was Cyrus McCormick? What did he invent? When? Name any large farm equipment of today which bears his name. (1:319; 3:501; 4:339; 5:404-405; 6:126, 128; 7:1336)

g. What effect did improved tools and machinery have on farm production? Did improved tools and machinery cause any change in home and foreign commerce? Why? What tools do you have in your homes which are different from the tools of the Revolutionary era? What improved tools has our city for building roads? What improved tools does our city farm own? (1:625-626; 2:125-126; 3:320, 349; 4:340; 5:405; 6:217; 7:1310)

h. If you were a farmer, what would you consider

the two outstanding farm inventions? Why? Could you use these two inventions in the city of Malden? Where? Could you use them at your property? Why not? (1:319; 2:340; 7:1336)

i. How did farming inventions affect city people? Are you affected by farming inventions? How? Does your mother serve fresh vegetables or fruit raised on a farm? Why should farm products be lower in price due to these farm inventions? (1:344)

j. Why should city boys and girls know about farm inventions? Would you like to live on a farm? Have you ever visited a large farm? Can you name any large farms near Malden? On your way to Revere Beach from Malden you pass several large farms. What is raised on these farms?

k. Why should rural boys and girls know about city inventions? Have any boys or girls from farm areas visited your neighborhood during the summer? What inventions are they mostly interested in? What home

improvements do they notice?

3. Transportation

   a. How important is transportation to a nation? Name five articles which you know have been transported to Malden. Name five articles which have been shipped from Malden. How important is transportation to the merchants, the owners of factories, and the people of Malden? (1:322; 2:129, 214; 3:97, 128; 6:230; 7:1338)

   b. Is this statement true or false, "Commerce is necessary both to the factories and to the farms." Explain. Is Malden a farming or industrial area? Why is commerce necessary to Malden or why is it not necessary to Malden? (1:325-326; 2:198; 3:315-316; 4:301-302; 7:1211)

   c. What means did the Indians use for transportation? The colonists? What methods have you used? Name three means of transportation used in Malden. (1:322; 2:33)

   d. Do you think America has become a great commercial nation? Give reasons to prove

your answer. Would you call Malden a commercial city? What would Converse Rubber Shoe Company, Malden Spinning and Dyeing Company, Robertson Tool Company, Friends' Beans Company and all the other one hundred and forty-six industries of Malden be able to accomplish without suitable transportation? (3:348-350; 2:367,389)

e. Could an engine used for turning machines in a factory be used to turn paddle wheels of a boat? Could the machine used in your Manual Training class be used to turn the paddles of a boat, if you had the proper wheels and leather straps? Does your father have any tool turning machines in his cellar? Explain briefly how he uses them. Compare your father's motor tools with a steam engine. Could they do about the same work? (1:322-324; 2:197)

f. Have you ever heard of Robert Fulton? What was he famous for? When did he live? (2:197; 3:138)

g. In what manner did the steamboat benefit the

Ohio, Mississippi and Missouri Rivers? Has the steamboat helped the people on the Malden River? Explain how the steamboat on the Malden River has affected your life. Did the steamboat have any connection with the farmers? What connection has the steamboat with the Malden coal companies and chemical companies? (1:324)

h. Explain this sentence, "The steamboat made the Atlantic much smaller." What has made the Atlantic Ocean still smaller today? Explain this sentence. "It took your grandmother several hours to go from Malden to Boston and today you can go to Boston from Malden in several minutes." (1:324)

i. How many railroads are there in your city? Visit the railroad station. Ask for a time table. Find out where the trains go. See if they carry passengers or freight or both.

j. Are there any differences between today's trains and tracks and the trains and tracks of the early American times? Explain why this is an improvement. (1:329-330)

k. Name the various types of locomotives used on trains from the beginning of their history. What type of locomotion is used on the Malden branches? Why do you suppose there is a different type of transportation used on the two Malden tracks? (1:423, 436; 2:198, 243-244)

l. Describe the famous contest in 1830 between the Baltimore and Ohio's "Tom Thumb" locomotive and a horse-drawn car. Which one would you expect to win? Which one would win today? Name one trans-continental air contest held today. (1:329-330; 2:223-224)

m. Give arguments of the eastern merchants for more and better railroads. Give arguments of the western farmers for more and better railroads. How are you affected by the railroads traveling in and out of Malden? Florida and California fruits are necessary for healthy people. How is it possible to have fresh fruits all year in Malden?

n. Explain this statement, "The world has become smaller due to railroads and steamboats."

Did your parents or grandparents ever cross the Atlantic? Do you know how long it took? How long would it take today? (1:327-328)

o. Does a railroad help a country? Why? How many miles of railroads are in our country today? How many miles of railroads are in Malden? Does the railroad help your city? Why? (2:223-224, 337)

p. Where was the first successful locomotive invented? Who invented it? (1:330-331; 2:223)

q. Do you think the government should help the building of railroads? Did the government assist the railroads? How? Why should the government be interested in joining Malden with the rest of the country? Explain how the railroads are the arteries of the country, helping to keep Malden and other communities healthy and self-supporting. (1:331)

r. How many changes in the ways of making a living in the cities did the Machine Age bring about? Has your grandfather's or

father's occupation been changed due to machine inventions? Do you live a different life in Malden due to the Machine Age? Explain. (1:339-340, 747-748; 2:212-213)

s. Should the new factories be protected from competition of foreign goods? What is your idea of a protective tariff? Why is the Waltham Watch Company having trouble today? Why are manufactured goods made in foreign lands cheaper than the articles manufactured in America? Can the Revere Knitting and Malden Knitting Mills make sweaters cheaper than the mills of Europe? Should they be protected? (2:212-213)

t. Would you be in favor of or against a bank run by the United States Government? Why? What were the good and the bad features of the United States Bank started by Alexander Hamilton? Are any banks run by the government today? Name the Malden banks. Who runs them? Do you or members of your family use the local banks? What services do the Malden banks offer? (1:196-197, 341; 2:180, 230)

v. What labor problems did the Machine Age cause men, women, and children? How many hours does your father or mother work? Are vacations and days off necessary to workers? Are the problems brought about by the Machine Age at least partially taken care of? (1:341-342; 2:360)

C. Optional Related Activities

This is a list of activities which you may use in studying this unit. There are two parts. Work individually or in groups. Before proceeding with each activity, secure my approval.

1. The Invention of Machinery

a. Write a story about James Hargraves, a clothmaker who invented a machine that could spin eight threads at one time. (1:311-312; 2:83; 7:1336)

b. Make a collection of pictures of all cloth-making machines. Write a short paragraph telling how you think each is run.

c. Carve a small spinning wheel out of soft pine wood.

d. Build any kind of a machine you desire out

of a Mechanic or Erector set.

e. Begin with the Englishman, James Hargraves, and make a list of inventors and a corresponding list of inventions which were known before 1860.

f. Write a short report on how steam, steel, and inventions made the Industrial Revolution possible. Try to find pictures that will illustrate your answers. (1:322-325; 2:222-223, 395; 5:288; 7:1999)

g. On an outline map of the United States place a picture of a factory building to mark Chicago, the city in which McCormick located his harvester factory. Around the margin of this map write the reasons that show this to be a wise choice of location.

h. Prepare an oral talk on how the factory system brought about the division of labor and a need for unskilled workers.

i. Draw a map of the United States. Color the sections of the United States affected by farming inventions one color and the sections of the United States affected by factory

inventions another color.

j. Draw or paint a poster showing a farm scene with one of the farm inventions you have studied in the picture.

k. Explain this statement made by Samuel Slater when he arrived in America from England: "The officials can search my pockets, they can search my baggage, but they cannot search my head."

l. Show on a graph how the invention of the cotton gin influenced agriculture, industry, and labor.

m. In one of the following ways show the changes that took place in the United States between 1800 and 1860.

(1) Pen and ink sketches.

(2) A story of the changes grandfather has seen in his lifetime.

(3) An illustrated lecture (talk) to be given to the class. Illustrations may be drawn or cut from magazines. Have pictures large enough for the class to see them clearly.

(4) An original story entitled "Aladdin and His Lamp Change American Life."

n. Secure a pasteboard carton. Stand it on one side, the open side of the box facing you. In it build a scene to represent a factory.

2. Transportation.

a. Prepare an oral talk on why improvement in transportation was necessary, if people were to benefit from changes in industry and agriculture. (1:322; 2:129, 215; 3:97, 128; 6:230; 7:1388)

b. Prepare an oral talk on how the building of roads and canals increased: (1) trade, (2) manufacturing, (3) western settlement, (4) the spirit of nationalism.

c. Copy the following statements and complete each with as many arguments as you can give:

(1) The Railroad said to the Factory, "You cannot exist without me because-----."

(2) The Factory said to the Railroad, "You cannot exist without me because-----."

(3) The Mine said to both the Railroad and the Factory, "You both cannot get along without me because-----."

d. Get a pasteboard carton. Stand it on one side, the open side of the box facing you. In it build a scene that will represent life in one of the three following sections of the country, the North, the South, or the West. (3:348-350; 2:367,389)

e. Draw or paint a locomotive of today.

f. Draw a picture graph illustrating railroad construction between 1835 and 1860.

g. Plan a trip to North or South Station, Boston, and watch the freight cars loaded and unloaded. Note the kinds of freight hauled and the quantity of freight. Note also where the freight is from.

h. Construct a sand table for the classroom displaying a railroad station, tracks, locomotives, trains, and freight.

i. Make a booklet entitled "Trains." In it write briefly of the history of trains. Illustrate with pen and ink sketches or with pictures cut from magazines. Plan an attractive cover and see that your material is well organized and arranged.

j. Make a large map of the United States and draw the main railroad routes of the country.

k. Draw a cartoon showing the effect of the railroad upon the stagecoach.

l. Attend the showing of the two motion pictures, "Industrial Revolution" and "Passenger Train" both produced by the Encyclopedia Britannica Film Corporation. The date and the time of the showing will be announced by the teacher. Be prepared to write a composition on three of the machines you see in the films.

m. Suggestions for other activities dealing with machines and inventions may be offered to the teacher for approval.

Pupils' References Required by Study Guide

1. Barker, Eugene C., Henry Steele Commager, and Walter P. Webb, The Building of Our Nation. Evanston, Illinois: Row, Peterson and Company, 1937.
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2. Montgomery, D. H., The Leading Facts of American History. Boston, Massachusetts: Ginn and Company, 1934.
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6. Southworth, Gertrude Van Duyn, and John Van Duyn Southworth, American History. Syracuse, New York: Iroquois Publishing Company, 1946.
Pages 24, 126-128, 144, 167, 217, 230.

7. The Lincoln Library of Essential Information. Buffalo, New York, The Frontier Press Company, 1929.
Pages 346, 435b, 688c, 701b, 1211, 1301, 1310, 1331, 1331c, 1335-1336, 1342b, 1345-1346, 1388, 1712a, 1755a, 1845d, 1873b, 1999.

Audio-Visual Aids

16mm. Films:

1. American Railroads

   Two reels, silent.

   Visual Education Service

   Malden Vocational High School--Mr. Leroy Twitchell

2. Cotton

   One reel, silent.

   Visual Education Service

   Malden Vocational High School--Mr. Leroy Twitchell

3. Growth of Cities

   One reel, sound. Daily charge, $1.00

   Good introductory film. Shows problems attending the development of small communities.

   Visual Education Service, Inc.

   116 Newbury Street, Boston, Massachusetts

4. Farming

   Two reels, silent.

   Visual Education Service

   Malden Vocational High School--Mr. Leroy Twitchell

5. Waterways and Ships

   One reel, silent.

   Visual Educational Service

   Malden Vocational High School--Mr. Leroy Twitchell

History Test

Directions: Read each statement carefully and encircle the T at the end of the statement, if you think it is true, or encircle the F, if you think the statement is false. If you do not know whether the statement is true or false, try it anyway.

Example: Eli Whitney, a young New Englander, invented the cotton gin. (T) F

Remember: Draw a circle around the T, if true, or around the F, if false.

1. An Englishman invented the power loom. T F
2. Edward Cartwright invented the loom which could be run by water power. T F
3. An American, James Hargraves, invented the power loom. T F
4. A machine for weaving is a loom. T F
5. A power loom was invented in the middle of the seventeenth century. T F
6. Weaving machines wove into cloth the great quantities of thread that the spinning jenny made. T F

7. New England was suited for farming and there was a lack of water power. T F

8. The invention of spinning machinery was important because no one had ever spun thread before. T F

9. The steam engine could run machinery in a factory. T F

10. The steam engine was put to work turning looms. T F

11. Elias Howe invented the steam engine. T F

12. A steam engine that could run machinery was invented in 1874. T F

13. A steam engine could not be used to run spinning wheels and looms. T F

14. James Watt invented the steam engine. T F

15. The same kind of power to run cloth-making machines was used for other manufacturing machines. T F

16. Saddles and harnesses could not be manufactured by means of machinery driven by water power. T F

17. Shoes could not be made by means of machinery driven by a steam engine. T F

18. People made cloth with machinery driven by water power and steam. T F

19. Factories have made people lose their freedom of time. T F

20. Before the coming of factories the workers were paid by wages. T F

21. It is better to make goods in a factory because factories are big buildings. T F

22. Women as well as men helped with the spinning at home before the Industrial Revolution. T F

23. There was more time for amusement for the people after the arrival of factories. T F

24. Men, women, and children worked in factories under easier conditions than they worked at home. T F

25. America has always been a manufacturing nation. T F

26. Workers could no longer do the work in their own homes because the machines cost too much money. T F

27. The only way the necessary machinery for manufacturing could be brought together T F

was for one worker to buy one piece and for another worker to buy another piece. T F

28. Steam, steel, and inventions made the Industrial Revolution possible. T F

29. The great changes in methods of work and living caused by the changes in machinery are called the Industrial Revolution. T F

30. The change from handwork to machine work was known as the Industrial Revolution. T F

31. Cities began to grow with the introduction of the factory system because people liked to work and live where there were crowds. T F

32. Under the factory system the workers were paid by the money they got from selling their products. T F

33. Eli Whitney invented the cotton gin in 1793. T F

34. The machine which separates the seeds from the cotton is the cotton gin. T F

35. More men were employed to make wagons, ships, and railroads after the cotton gin was invented. T F

36. Eli Whitney's invention made the labor of cotton cleaning fifty times less and threw T F

a class of people out of work. T F

37. The sewing machine was invented in 1746. T F

38. Elias Howe invented the sewing machine. T F

39. The English inventions in textile machinery were brought to America by Cyrus W. Field. T F

40. With the invention of the sewing machine the clothing business became a factory industry employing large numbers of women. T F

41. The iron stove was invented about 1740. T F

42. The iron stove had a grate which held the coal above the floor and this created a draft which caused the coal to burn too quickly. T F

43. Farmers used practically the same kind of tools in 1776 as the farmers did in Biblical times. T F

44. Even after the Revolutionary War farm tools were made of wood. T F

45. If we had not found new ways of working iron, there would not have been enough iron to make all the machines we needed. T F

46. In the early nineteenth century iron was used for plows and harrows. T F

47. Threshing machines can be used to separate the grain from the straw. T F

48. Cattle were often used to trample the grain from the straw before the threshing machine was invented. T F

49. Threshing machines were beginning to be used in 1768. T F

50. A reaper separates the grain from the straw. T F

51. Before the invention of the reaper men cut the grain with scythes and sickles. T F

52. Cyrus McCormick invented a successful reaper in 1831. T F

53. The first successful reaper could do the work of five men. T F

54. The essential parts of a reaper are a platform to receive the grain and a reel to gather it in. T F

55. The invention of the reaper resulted in increased home and foreign commerce. T F

56. Improved tools and machinery increased farm production. T F

57. Increased farm production enlarged both domestic and foreign commerce. T F

58. Improved farming tools and machinery increased unemployment over the country. T F

59. Larger farm crops due to improved machinery caused less trade with foreign countries. T F

60. The first great step in the improvement of transportation was the invention of the steamboat. T F

61. The steamboat was not important for shortening the time of trips. T F

62. The steamboat reduced the cost of carrying freight. T F

63. Robert R. Livingston helped Robert Fulton financially. T F

64. A steam engine could not be made to drive a boat on the water. T F

65. The "Clermont" steamed up the Hudson against the current in 1807. T F

66. The first successful steamboat, The "Clermont," had a speed of seven miles an hour. T F

67. Railroads helped to send messages because they carried letters free. T F

68. A train sets out from Washington in the T F

morning and the passengers will breakfast in Baltimore. T F

69. The locomotive came into existence in 1812. T F

70. In 1812 the city of New Orleans was constructing a railroad to California. T F

71. A railroad was built in 1840 from Boston to Portland to Montreal. T F

72. Baltimore, Philadelphia, New York, and Boston had rail connections with Chicago and St. Louis. T F

73. New Orleans and Mobile had train connections with the Great Lakes. T F

74. The United States Government gave aid to railroad companies in 1850. T F

75. The United States Government gave public land to western railroad companies which the companies could mortgage or sell to raise money. T F

76. The eastern and western railroad companies were able to pay for their own railroad construction. T F

77. It was against the law to give away public lands. T F

78. Between 1850 and 1860 railroad mileage increased from 9,000 miles to 30,000 miles because of the many rich men owning the companies. T F

79. The United States Government helped railroad companies so that the East and the West would be closer together. T F

80. Locomotives were used to haul freight before 1850. T F

81. The railroads carried the agricultural products of Massachusetts to the West. T F

82. The railroads enabled the western farmers to sell their crops in the East. T F

83. The railroads enabled the western farmers to buy factory goods from the East. T F

84. The railroads carried the agricultural products of the West to the East. T F

85. Cities began to grow to a great size because the factories brought together so many people in one place. T F

86. Our factories met competition from foreign factories. T F

87. A protective tariff was wanted so that foreign T F

goods could be sold in this country.

88. In 1816 the United States Government ran a banking business. T F

89. In 1862 Congress passed the Homestead Act which gave 100 acres of land to all settlers who wished to build a home. T F

90. The Indians moved west of the Mississippi at the request of President Jackson. T F

CHAPTER III

EVALUATION AND RESULTS

Comments of the teacher. The unit method of teaching requires a great deal of preparation and planning before the unit can be taught. Three basic factors must be dealt with minutely in order to put the unit method into practice. The pupils, the classroom, and the subject-matter are these basic factors.

The teacher must know all his pupils and their capabilities and background. Before this method was used, very little information concerning the pupils was available for the teacher but after a questionnaire and visits to the homes of the pupils, information and data were plentiful. The questionnaire gave the teacher the facts of the pupils' home life and then the teacher followed up this questionnaire by visits to many of the homes.

The questionnaires brought out such facts as their mothers' and fathers' educational background, what course the pupils considered following in high school, what ambitions they had, what their favorite subjects were, what the most disliked subjects were, and other experiences which would enable the teachers to understand and know

his pupils. Before this unit method was planned, the teacher didn't know his pupils. The results of this prepared unit made him realize how very little information he had previously. The California Test of Mental Maturity and the Iowa Every Pupil Tests of Basic Skills given by the authorities of the Browne Junior High School were used by the teacher in order to know the pupils' mental abilities. A careful study of the pupils' health records was made. All this information was of considerable assistance to the teacher in knowing all his pupils very thoroughly. These results also caused several conferences of the parents, Principal William J. Sullivan, and the teacher.

The teacher found that many parents were curious to know what was going on in the history class. Many parents commented that they had never heard of such a method and still others claimed that they understood that the wealthier, nearby communities used such methods and they were glad to see Malden employ such techniques as they realized that their children would be competing with children of these nearby communities in future years. The teacher had five times as many visits of parents during this unit method period as in any other previous

period of time. One pupil stated that her mother and father liked this new idea because there were some things they hadn't known before but were quite interested in now. The parents' curiosity was remarkable. One parent came to the school in order to have a report of home work required sent to his home each week. This occurred during this unit. He claimed that he didn't need to know about the history assignments for his son knew what they were five weeks in advance.

The room and the equipment for this unit were given ample thought and consideration. Principal Sullivan cooperated with the teacher in every way possible. A large work table used by pupils in Optional Related Activities was secured as was a fifteen-foot display table. The pupils received great pleasure in seeing their products and their classmates' projects on display. A file cabinet mentioned and described in Chapter I, page three, was obtained through the helpfulness of Miss Marguerite Clarke, instructor of music at the Browne Junior High School. The manual training teachers, Mr. Frank Martin and Mr. Frederick Campbell, were most considerate in providing three new bulletin boards and also aiding the pupils in their Optional Related Activities. The stationary desks

and chairs of the pupils were a handicap. If the desks and chairs had been movable, group discussions and class discussions would have been easier to conduct. Movable desks and chairs would have helped in Optional Related Activities for some of the pupils had a difficult time with their large posters on the stationary desks and with other activities which required more desk space. Miss Nancy Deering, art instructor, furnished signs needed for the room and helped the pupils in their paintings and drawings dealing with this unit. A class library was put together with the assistance of Miss Dorothy Howlett, instructor of English and teacher-in-charge of the book room. As a result of this conference our class library consisted of two complete history sets and various numbers of different history texts collected through the years. The school librarian, Miss Clara Brooks, and the local community library furnished the pupils with additional books and an encyclopedia.

The result of all these conferences with other teachers and the principal was a better understanding between the teachers and a clearer insight into each other's subject. More teachers came into this room than ever before in order to see what was taking place in room

three hundred twenty-two. A regular school building teachers' meeting was held in this room during the last days of the unit. Never before had a meeting been called for on the second floor of the building. After the meeting all the teachers stayed in the room to notice the displays, the bulletin boards, the classroom library, the file cabinet, and other results of the unit method. Many questions were asked by the teachers and results of the unit were asked for. Upon completion of the unit all tables showing the results of this unit were brought to the attention of interested teachers.

During an optional related activity period the school department electrician, who has been visiting classrooms for the past twenty years asked, "What are they doing, playing games? They are very busy. They must like what they are doing, whatever it is." The teacher answered this question by explaining what optional related activity means.

The core activity and the optional related activity required a great deal of time to prepare. Several hundred questions make up the core activity and much time and thought are required to produce this guide. However, when it is finished, the teacher has his work for the next five

PLATE 8. CLASSROOM WITH SOME UNIT METHOD IDEAS.

PLATE 9. ANOTHER VIEW-CLASSROOM WITH SOME UNIT METHOD IDEAS.

PLATE 10. CLASSROOM DURING UNIT METHOD.

PLATE 11. ANOTHER VIEW-CLASSROOM DURING UNIT METHOD.

weeks well organized. The teacher has his objectives written down in declarative sentences which are before him at all times. The best result as far as the teacher is concerned is that he knows what he is trying to teach and he knows what is going to be done each period. The objective type tests were very well received by the pupils. The subject matter brought every day living and community life into the history class. Family life was brought out to the forefront by the study guide. Questions concerning factories, mothers' work, and fathers' work made the pupils more conscious of what their fathers were doing and what their chums' fathers were doing.

Comments of the pupils. These pupils were studying letter construction in their English classes and after a conference with Mr. Frank Silverstein, their English instructor, an English assignment was given to the pupils which involved explaining in a letter why they liked or disliked the current method of history learning. The following excerpts are samples of what they wrote.

Letter 1

"I like this new process of education. Optional Related Activities are very good things because then most of the pupils can show their

talent and they can do the things they like to do. Core Activities are a good way of teaching too. They teach us more because in looking for one answer, we may read five pages out of a book before we find it."

Letter 2

"Some of the history books are old and I am not particular about reading things that the Indians or pioneers did. I do like to know about what is happening today. Even when I go home and have my mother and father help me, I learn something new. My mother and father like this method, too. There are some things they didn't know before but are quite interested in now. I do hope this method in history continues."

Letter 3

"I like the new method of teaching very much. It makes our homework much more interesting. We learn much more about a topic when we look it up in reference books. I think the Core Activity gives everyone a chance to get a good mark."

Letter 4

"I think the new method of teaching is much

better than the old way. The homework is much easier because we can do as much as we want at one time. The Core Activities are much better than making outlines and answering questions from our history books. The tests are easier because they are all true or false questions, many choice answers or pairing columns, and if we do all our Core Activities, we will know the test answers. The tests are easier because they do not require as much writing as the old method of giving tests. The Optional Related Activities are good because they make the students more interested in history. I hope this method of teaching history will continue the rest of the year."

Letter 5

"I like this new type of learning history because it is so much more interesting. The homework of answering the questions in the Core Activities is better than just reading because when we usually read, we read quickly just so we can answer "yes" when asked if we did our homework. When it comes to a test, we don't know any of the answers because we read so fast. We didn't

know what we were reading. Answering the questions of the Core Activity we have to go slowly so we know what it's all about and then we know most of the answers on the tests."

Letter 6

"I have enjoyed this new method much more than the textbook method. Comparing the two ways, I have found that we get much more out of this new method. The old method is boring. After supper we have to read, then you ask us questions, and then you test us. In the Core Activity it is all written out for us, and any time we want to get ahead in our work we are not afraid to do so."

Letter 7

"This way I like much better. I find the questions rather hard but I most always find the answers. The Optional Related Activities are nice too because you can do whatever you enjoy most and it is learning history too."

Letter 8

"I am happy to say that I like Optional Related Activities. I like them because it gives me a chance to work in the way that I want to. I like

Core Activities because if you are absent, you can do it ahead so it is much better."

Letter 9

"I especially like the Optional Related Activities because you learn to make things, and I think you could understand more about history if you were doing it yourself. I mean you would be making things of interest with your own hands."

Letter 10

"I don't like it in one way because there is too much homework to it. One thing I do like about it is that there are questions in it you do not need the book to look up the answers in. You always know what you are going to do tomorrow."

The pupils were almost unanimous in expressing genuine enthusiasm for the Unit Method of teaching. They enjoyed their classes more and were pleased that they were accomplishing more and getting higher grades.

Poorer students felt that their history mark did not depend on their reading and writing so they too had a chance to improve. All students liked knowing their assignments in advance. All liked the true and false tests, especially students poor in English.

Comments of pupils heard in the classroom or near the school:

"We know what we are doing in history with this kind of a lesson."

"What unit are we going to do after this one?" Teacher replied, "Well, we'll have to go back more or less to the old method." "Oh, no," exclaimed several pupils.

"We know what we are going to do in history next week and the week after."

"If you want to go ahead, you don't have to wait for the rest of the class."

"The tests are almost always on the Core Activities and if we did them at home, we would surely pass."

"I like this method better than just reading a dull book and answering questions."

"I would rather look on the page you have given us for the answers and find it than read eight to ten pages each night."

"I like the Optional Related Activities because it is fun working on different things and you get a chance to work with others."

"It makes you want to go ahead and learn more."

"I like it because it has brought up my marks."

"I do not get tired of history. We have different things every day and still we learn a lot."

"The test questions are specific so we like them."

"We are doing something we like to do but we are doing our school work too. I wish we could go on with it."

"You can always do your homework in advance, and you know definitely what to do for homework."

"I learn more when I look through the book for answers. I come upon other things I have never heard about."

Only five students expressed dissatisfaction with the method. Their reasons were as follows: "Too much homework and I forget what I look up; I can understand history better by reading the book; I'd rather have a test every week than have such a long one at the beginning and at the end; the Core Activities take too long; the test was too long; I don't remember as much."

Results of Optional Related Activities. The Optional Related Activities were well received by the pupils. All but two students participated in this portion of the unit method. These two exceptions wanted to watch other groups make models of machines and the teacher believes that the two students grew educationally by their

powers of observation. The students wanted to try to operate the model when it was completed and the group gave their permission. When the next unit is taught, these students will voluntarily try some project of their own. Many and varied were the projects of these classes. Models of all kinds of boats, planes, cotton gins, trains, sewing machines, spinning wheels, looms, and steam engines were made. Paintings, drawings, and scene models were favorite activities. Compositions, facts from encyclopedia, and picture scrap books were passed in for display. A small group of girls wrote and produced a one-act play dealing with the times of our unit. One boy brought in a model of an early ship valued at six hundred dollars. The boy's father was interested in our work and for the first time allowed the ship to be brought to school. The individual differences of the slow learner, the average learner, and the fast learner are well taken care of in a well organized and planned Optional Related Activities program. All students wanted and had their products of this program placed on display with a name tag identifying each object and its owner. Bulletin boards, the top mouldings of the blackboard, and tables were used for this purpose.

Slow Learners in Reading. Thirteen pupils taking the final test were two and three years below their grade level in reading. As a true result of the unit method was desired, the final examination was read to these students, question by question. They saw the question on paper and they heard the question. As table thirteen, page 87 shows, the true mean of this group in the final was sixty-eight. Although the true mean of the slow reading group was sixty-eight and the true mean of the rest of the pupils was seventy-two, the average gain for the slow reading group was twenty and three tenths, and the average gain of the remaining pupils was twenty and two tenths.

The conclusion can be drawn that the slow reading students learned just as much as the average and fast reading students did. If the questions of the test were not read to them, their mark would depend partly upon reading and partly upon history.

Results of tests. The results of the pre-test and final test for all pupils and the amount of gain or loss are given in table ten. The intelligence quotient rating of the children ranged from sixty-five to one hundred thirty-four. The lowest mark in the pre-test was thirty-seven, while the lowest in the final test was fifty-five.

The highest grade in the pre-test was fifty-nine, while in the final test one student had eighty-three.

Table 10. Intelligence Quotient, Initial Score, Final Score, and Points of Gain of Each Pupil in Test

Pupils (1)	I.Q. (2)	Pre-Test (3)	Final Score (4)	Gain (5)
1	80	47	68	21
2	103	53	79	26
3	101	48	75	27
4	110	56	79	23
5	74	43	72	29
6	95	47	72	25
7	98	50	76	26
8	73	52	67	15
9	111	58	75	17
10	100	52	63	11
11	109	37	59	22
12	109	55	75	20
13	122	55	74	19
14	134	59	73	14
15	96	55	73	18
16	121	55	78	23
17	91	45	68	23
18	122	50	73	23
19	88	47	66	19
20	116	51	76	25
21	118	51	80	29
22	90	47	56	9
23	112	45	69	24
24	65	52	61	9
25	93	52	72	20
26	109	52	70	18
27	106	46	59	13
28	111	59	83	24
29	111	55	79	24
30	97	42	69	27
31	108	52	79	27
32	95	48	72	24
33	115	45	75	30
34	118	43	75	32

Table 10 (continued)

Pupils	I.Q.	Pre-Test	Final Score	Gain
(1)	(2)	(3)	(4)	(5)
35	118	44	71	27
36	106	45	74	29
37	87	51	68	17
38	87	49	65	16
39	112	41	69	28
40	96	43	69	26
41	96	48	69	21
42	95	46	58	12
43	111	43	68	25
44	96	49	66	17
45	104	49	68	19
46	106	42	71	29
47	123	55	78	23
48	107	48	68	20
49	109	40	75	35
50	127	49	69	20
51	101	48	74	26
52	109	48	70	22
53	100	52	60	8
54	97	49	70	21
55	102	54	79	25
56	91	57	73	16
57	102	49	64	15
58	113	47	77	30
59	83	38	66	28
60	93	49	70	21
61	96	46	64	18
62	109	51	67	16
63	129	51	79	28
64	100	43	71	28
65	102	58	75	17
66	100	46	68	22
67	97	49	72	23
68	126	58	81	23
69	103	54	76	22
70	105	44	73	29
71	108	52	68	16
72	92	47	58	11
73	76	49	67	18
74	111	55	69	14
75	114	51	71	20

As shown in table eleven, the assumed mean in the final test was seventy and five tenths. The mean proved to be seventy and seventy-four hundredths. The range of scores in the final test was from fifty-six to eighty-three.

Table 11. Calculations of the Mean and Standard Deviation of the Final Test

Scores in class intervals of two	Sum of tallies	Deviations of class intervals above and below an assumed mean	Product of column (2) and column (3)	Product of column (3) and column (4)
	F	D	FD	FD
(1)	(2)	(3)	(4)	(5)
82-83...	1	6	6	36
80-81...	2	5	10	50
78-79...	8	4	32	128
76-77...	4	3	12	36
74-75...	10	2	20	40
72-73...	10	1	10	10
70-71...	8	0		
68-69...	15	-1	-15	15
66-67...	6	-2	-12	24
64-65...	3	-3	- 9	27
62-63...	1	-4	- 4	16
60-61...	2	-5	-10	50
58-59...	4	-6	-24	144
56-57...	1	-7	- 7	49
54-55...				
Totals	75		9	625

Assumed Mean...70.5

Mean=A.M. $\pm$ (FD$\div$N) x 2, wherein A.M. refers to the assumed mean and N stands for the number in the group.

M= 70.5+(9÷75) x2

M= 70.5+.12 x2

M= 70.5+.24

M= 70.74 (or 71 for all practical purposes)

Standard Deviation $= \sqrt{\frac{FD^2}{N} - \left(\frac{FD}{N}\right)^2}$ x size of class interval

S.D.$= \sqrt{\frac{625}{75} - \left(\frac{9}{75}\right)^2}$ x2

S.D.$= \sqrt{8.33 - .02}$ x2

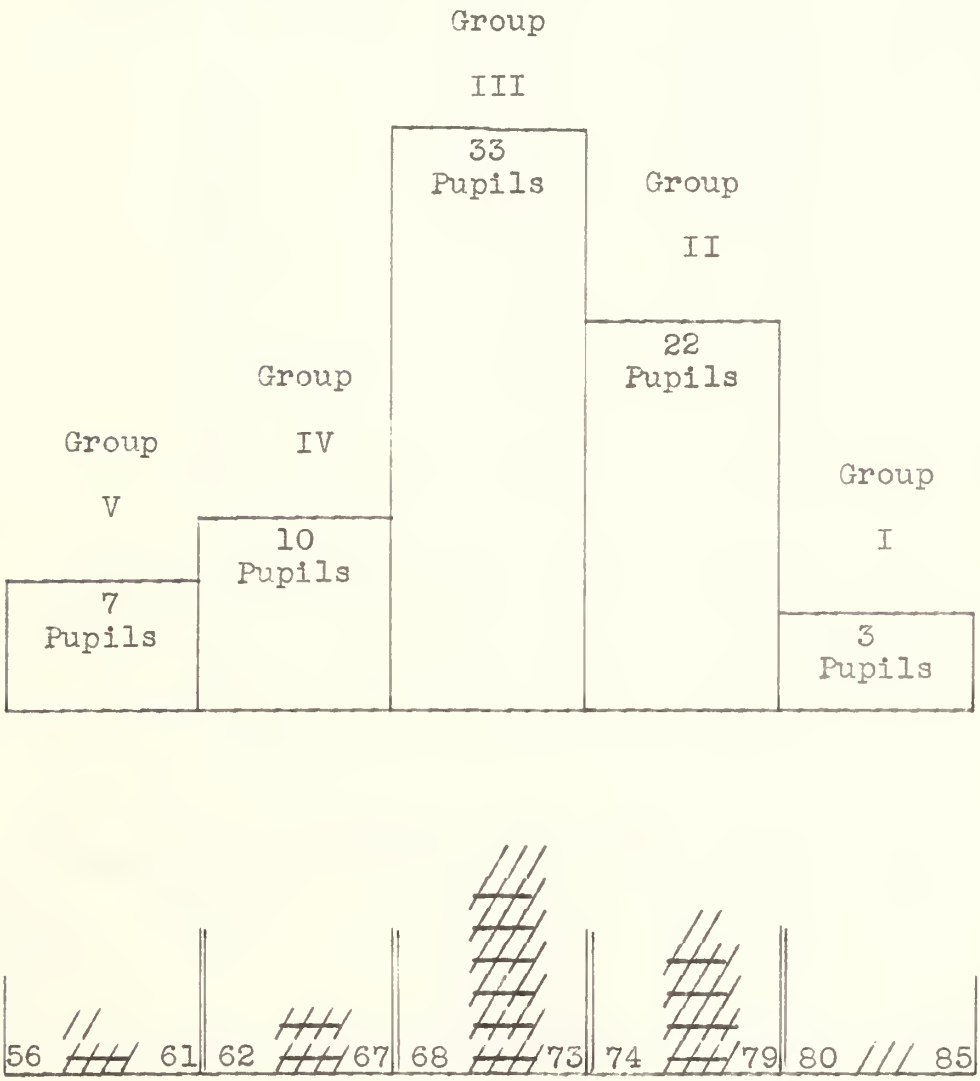
S.D.$= \sqrt{8.31}$ x2

S.D.= 2.9 x2

S.D.= 5.8 or 6 (for all practical purposes)

An examination of relative growth scales shown below in table twelve shows that three pupils ranked in the highest group and seven pupils were in the lowest classification. Forty-four per cent of the pupils were in the middle section.

Table 12. Relative-Growth Scales



Slow learners in reading and their test marks have already been discussed in Chapter III, page 81. Complete results of their tests together with their reading ability are given in table thirteen.

Table 13. Slow Learners in Reading

Pupil	Reading Ability	Pre-test	Final Test	Gain
(1)	(2)	(3)	(4)	(5)
8	4-3	52	67	15
11	4-8	37	59	22
15	5-2	55	73	18
23	4-9	45	69	24
26	3-5	52	70	18
34	4-8	43	75	32
36	4-5	45	74	29
37	3-9	51	68	17
42	4-7	46	58	12
51	4-7	48	74	26
56	4-8	57	73	16
59	4-8	38	66	28
60	5-0	49	70	21

Table fourteen gives the mean and standard deviation of the final test for the slow readers. The mean for this group was sixty-eight and forty-six hundredths.

Table 14. Calculations of the Mean and Standard Deviation of the Final Test

Scores in class intervals of two	Sum of tallies	Deviations of class intervals above and below an assumed mean	Product of column (2) and column (3)	Product of column (3) and column (4)
	F	D	FD	FD^2
(1)	(2)	(3)	(4)	(5)
74-75...	3	2	6	12
72-73...	2	1	2	2
70-71...	2	0		
68-69...	2	-1	-2	2
66-67...	2	-2	-4	8

Table 14 (continued)

Scores in class intervals of two	Sum of tallies	Deviations of class intervals above and below an assumed mean	Product of column (2) and column (3)	Product of column (3) and column (4)
(1)	(2)	(3)	(4)	(5)
64-65...		-3		
62-63...		-4		
60-61...		-5		
58-59...	2	-6	-12	72
Totals	13		-10	96

Assumed Mean...70 Mean=A.M.+(FD÷N) x2, wherein A.M. refers to the assumed mean and N stands for the number in the group.

M=70+(-10÷13) x2

M=70+(-.77) x2

M=70+1.54

M=68.46 (or 68 for all practical purposes)

Standard Deviation= $\sqrt{\frac{FD^2}{N}-\left(\frac{FD}{N}\right)^2}$ x size of class interval

S. D.= $\sqrt{\frac{96}{13}-\left(\frac{10}{13}\right)^2}$ x2

S. D.= $\sqrt{7.38-.59}$ x2

S. D.= $\sqrt{6.79}$ x2

S. D.=2.6 x2

S. D.=5.2 or 5 (for all practical purposes)

Key to True and False Test

1. True	23. False	45. False
2. True	24. False	46. True
3. False	25. False	47. True
4. True	26. True	48. True
5. False	27. False	49. False
6. True	28. True	50. False
7. False	29. True	51. True
8. False	30. True	52. True
9. True	31. True	53. False
10. True	32. False	54. False
11. False	33. False	55. True
12. False	34. True	56. True
13. False	35. True	57. True
14. True	36. True	58. False
15. True	37. False	59. False
16. False	38. True	60. True
17. False	39. False	61. False
18. True	40. True	62. False
19. True	41. False	63. True
20. False	42. False	64. False
21. False	43. True	65. True
22. True	44. True	66. False

67. False
68. True
69. True
70. False
71. True
72. True
73. True
74. True
75. True
76. False
77. False
78. False
79. True
80. False
81. False
82. True
83. True
84. True
85. True
86. True
87. False
88. True
89. False
90. True

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